EROSION PREDICTION

PAST

FUTURE

PRESENT

IN THE BEGINNING...

Universal Soil Loss Equation

Soil Loss Equation

$$A = R \times K \times L \times S \times C \times P$$

IN THE BEGINNING...

Universal Soil Loss Equation

- Hand calculations (or slide rules)
- Look up tables

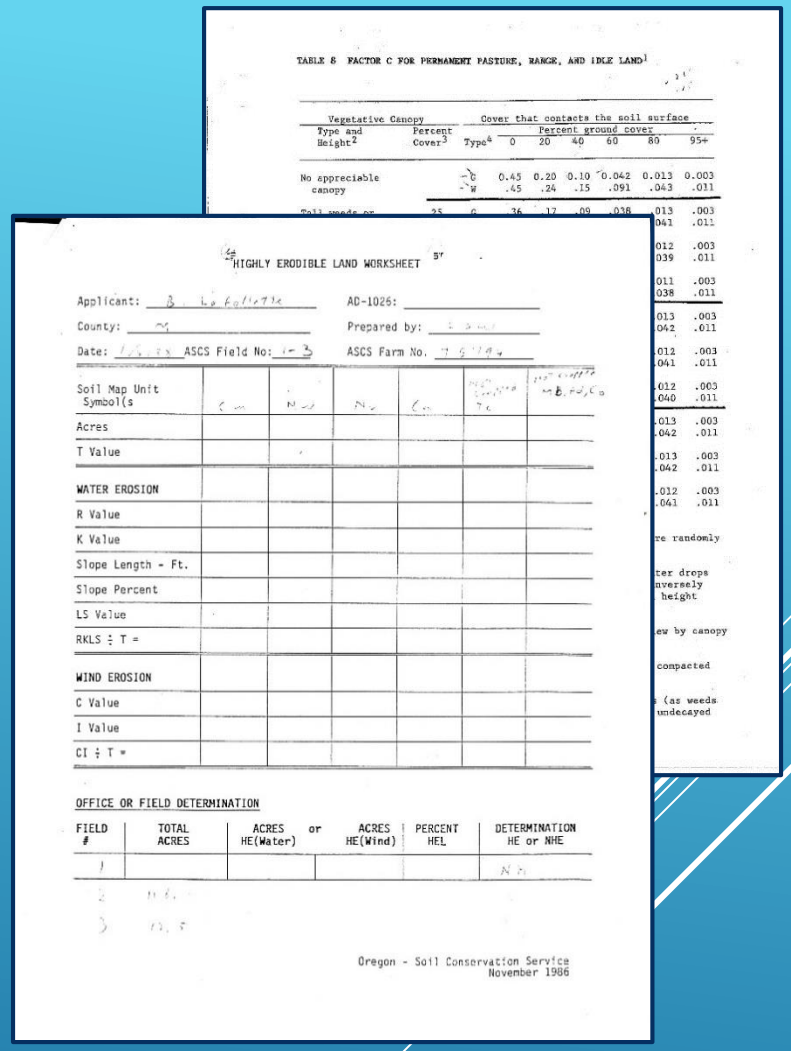


TABLE 8 FACTOR C FOR PERMANENT PASTURE, RANGE, AND IDLE LAND[1]

Vegetative Canopy: Type and Height[2]	Percent Cover[3]	Cover that contacts the soil surface: Type[4]	Percent ground cover: 0	20	40	60	80	95+
No appreciable canopy		G	0.45	0.20	0.10	0.042	0.013	0.003
		W	.45	.24	.15	.091	.043	.011
	25	G	.36	.17	.09	.038	.013	.003
							.041	.011
							.012	.003
							.039	.011
							.011	.003
							.038	.011
							.013	.003
							.042	.011
							.012	.003
							.041	.011
							.012	.003
							.040	.011
							.013	.003
							.042	.011
							.013	.003
							.042	.011
							.012	.003
							.041	.011

re randomly

ter drops
nversely
height

ew by canopy

compacted

(as weeds
undecayed

HIGHLY ERODIBLE LAND WORKSHEET

Applicant: _____ AD-1026: _____

County: _____ Prepared by: _____

Date: _____ ASCS Field No: _____ ASCS Farm No. _____

Soil Map Unit Symbol(s)						
Acres						
T Value						
WATER EROSION						
R Value						
K Value						
Slope Length - Ft.						
Slope Percent						
LS Value						
RKLS ÷ T =						
WIND EROSION						
C Value						
I Value						
CI ÷ T =						

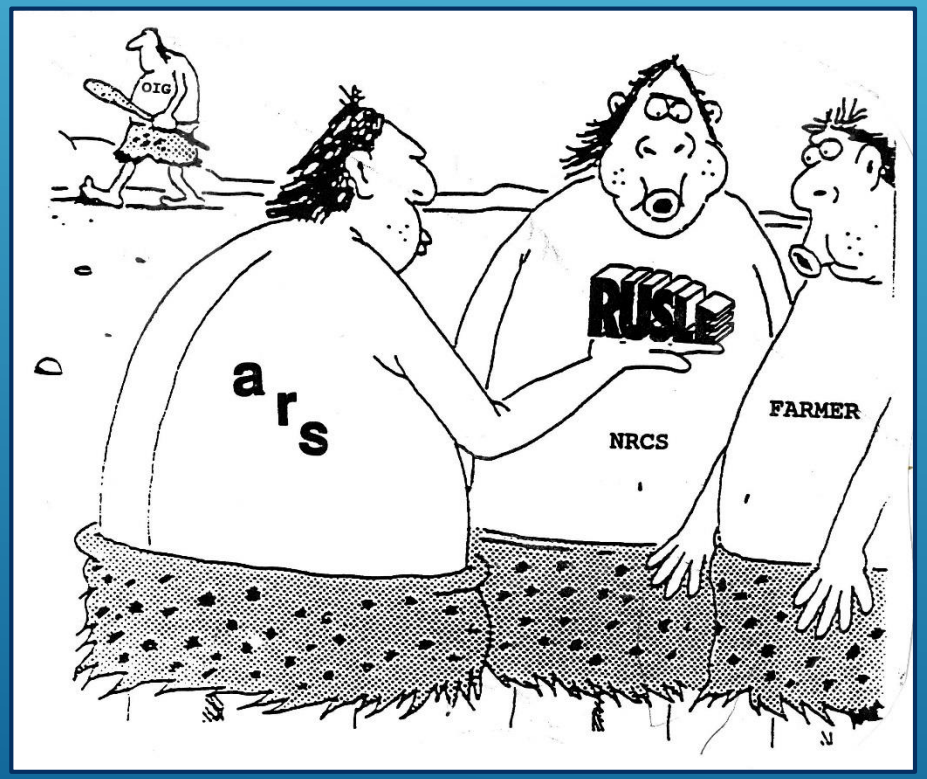
OFFICE OR FIELD DETERMINATION

FIELD #	TOTAL ACRES	ACRES HE(Water)	or ACRES HE(Wind)	PERCENT HEL	DETERMINATION HE or NHE

Oregon - Soil Conservation Service
November 1986

TIME MARCHES ON…

Revised Universal Soil Loss Equation(RUSLE)

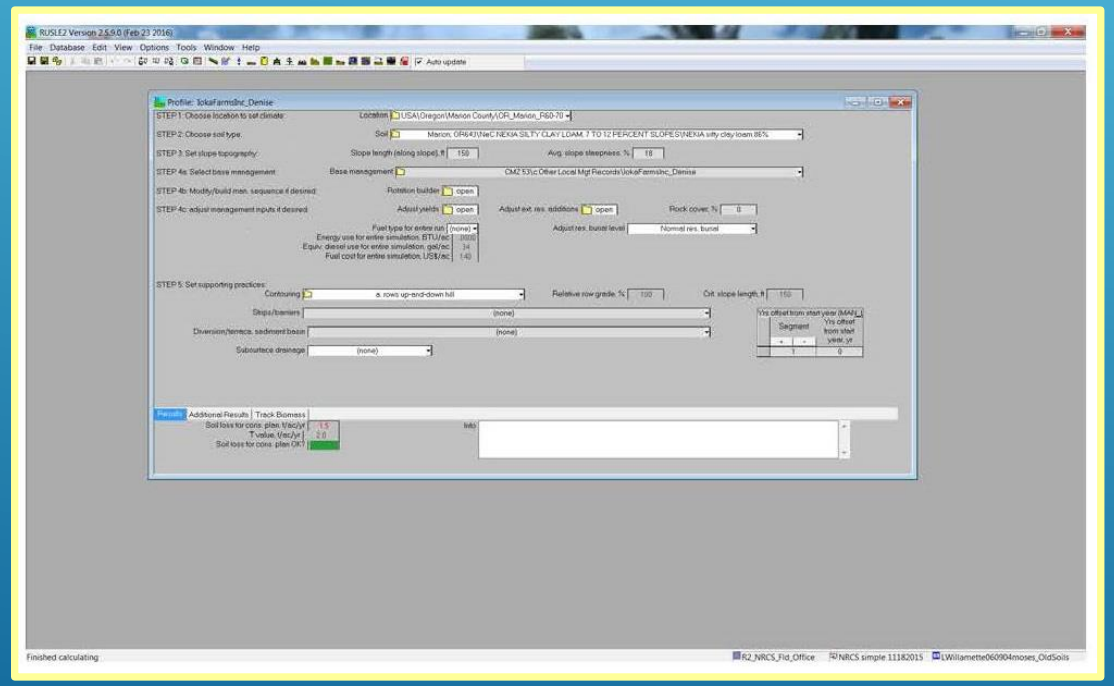


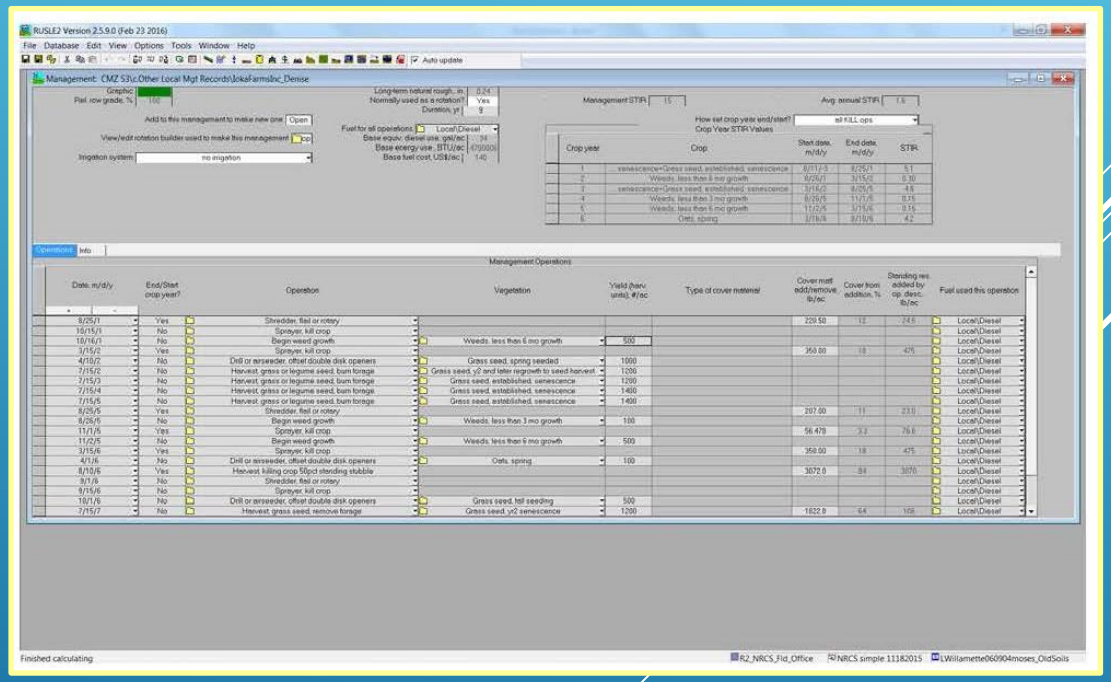
With additional research, experiments, data, and resources become available, research scientists continued to improve USLE, which led to the development of Revised Universal Soil Loss Equation (RUSLE). RUSLE has the same formula as USLE, but has several improvements in determining factors. These include: some new and revised isoerodent maps; a time-varying approach for soil erodibility factor; a sub-factor approach for evaluating the cover-management factor; a new equation to reflect slope length and steepness; and new conservation-practice values.

Translation: USLE was set up to calculate on two week intervals. RUSLE was a daily model. Also, USLE was long-hand calculations or slide-rule calculations whereas RUSLE was DOS based software.

BRINGS US TO TODAY…

Revised Universal Soil Loss Equation Version 2 (RUSLE2)





THE FUTURE

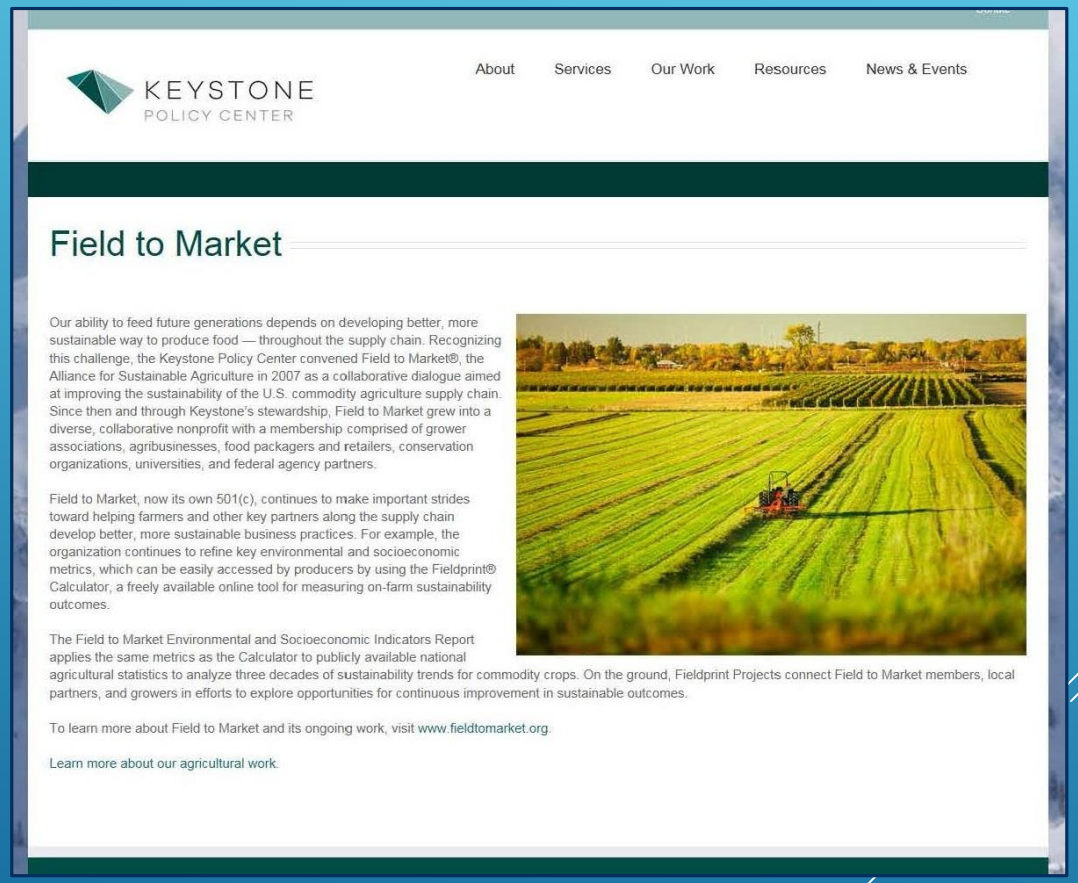
Integrated Erosion Tool

- IET enables the analysis of soil erosion by water and wind using RUSLE2 and WEPS.
- Developed by the USDA Agricultural Research Service (ARS)
- Includes a geospatial IET application extending the resource analysis functionality of the Customer Service Toolkit (CST)

THE FUTURE

Integrated Erosion Tool

IET services also support the Keystone Center's *Field to Market Initiative* involving a consortium of public and private sector food supply chain organizations.



THE FUTURE

Keystone Full Members

KEYSTONE POLICY CENTER

THE FUTURE

Integrated Erosion Tool

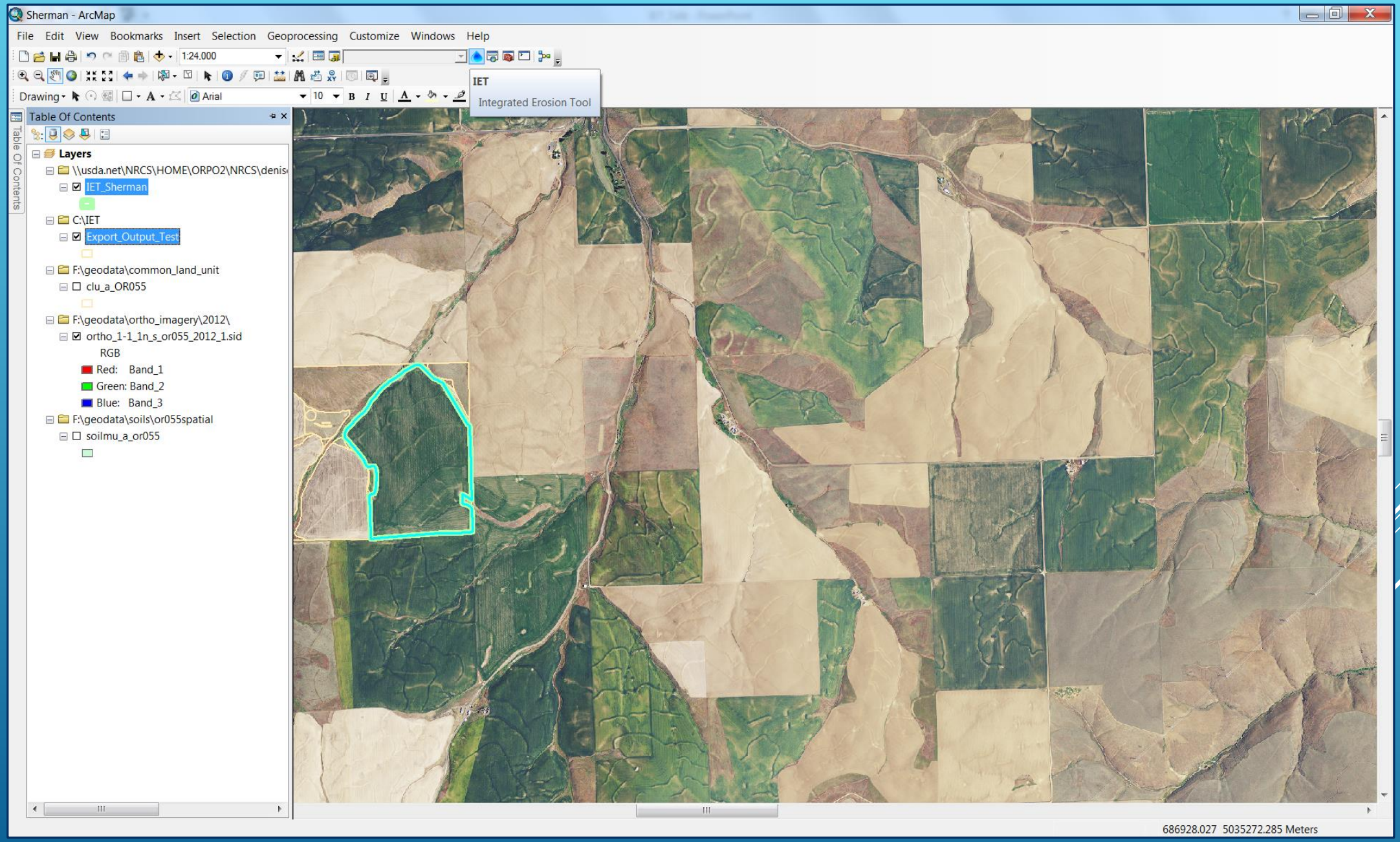
Calculates:

- Sheet/rill erosion
- Wind erosion
- PM10 air particulate matter
- Soil Conditioning Index(SCI)
- Soil Tillage Intensity Rating (STIR)

THE FUTURE

Integrated Erosion Tool

- The Water Erosion Prediction Project (WEPP) model has been added providing concentrated flow erosion, gully erosion, and sediment delivery calculations.
- The Rangeland Hydrology and Erosion Model (RHEM) model service will calculate soil erosion by water on rangeland.


Sherman - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
1:24,000
IET
Integrated Erosion Tool
Drawing
Arial
10
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Layers
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IET_Sherman
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RGB
Red: Band_1
Green: Band_2
Blue: Band_3
F:\geodata\soils\or055spatial
soilmu_a_or055
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Integrated Erosion Toolkit
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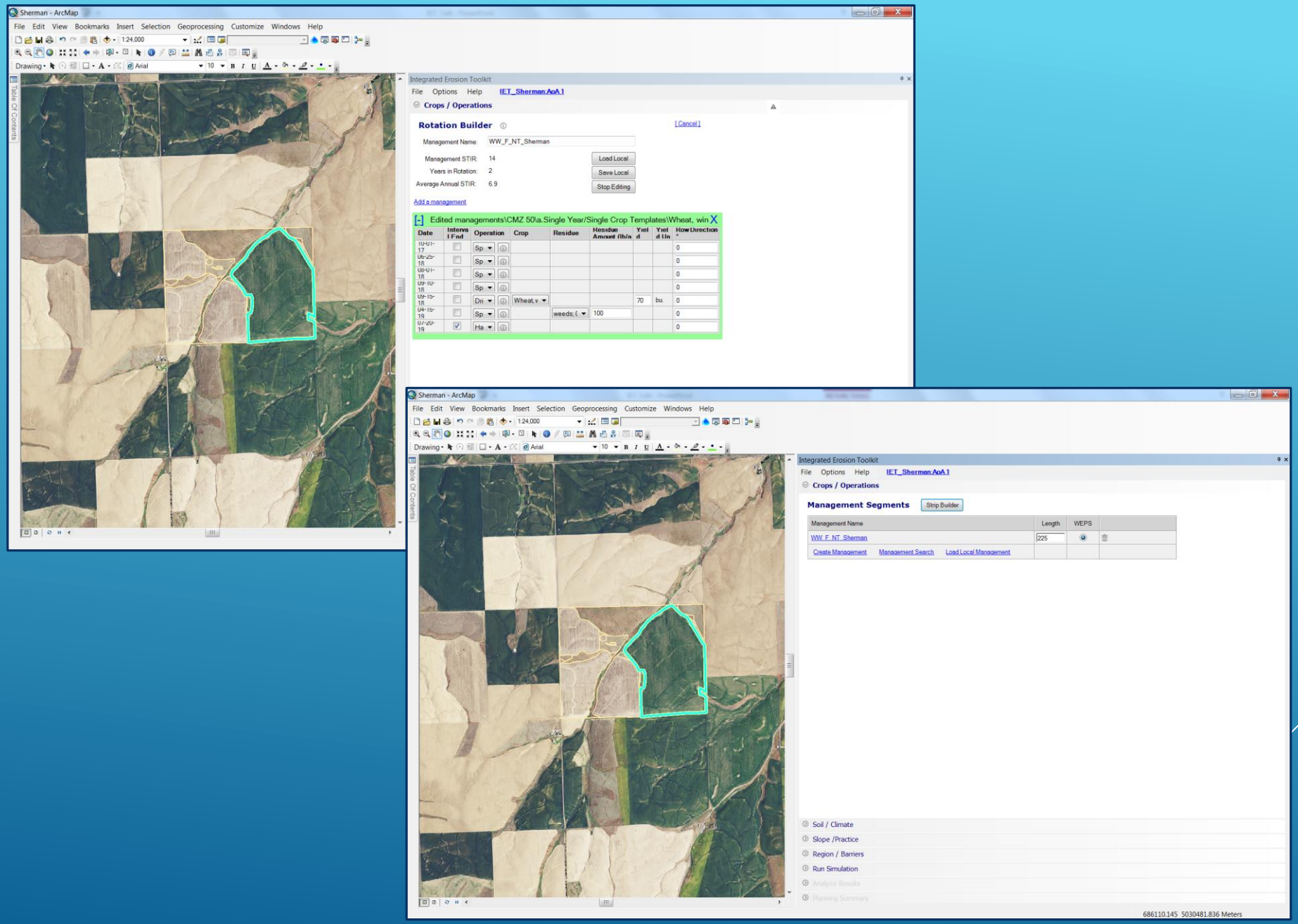
Soil / Climate
Slope /Practice
Region / Barriers
Run Simulation
Analyze Results
Planning Summary


Sherman - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
Integrated Erosion Toolkit
File Options Help IET_Sherman:AoA 1
Crops / Operations
Rotation Builder
[Cancel]
Management Name: WW_F_NT_Sherman
Management STIR: 14
Years in Rotation: 2
Average Annual STIR: 6.9
Load Local
Save Local
Stop Editing
Add a management
[-] Edited managements\CMZ 50\a.Single Year/Single Crop Templates\Wheat, win X
Date
Operation
Crop
Residue
Residue Amount (lb/a
Yield
Yield Un
Row Direction
Sherman - ArcMap
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Management Segments
Strip Builder
Management Name
Length
WEPS
WW_F_NT_Sherman
225
Create Management
Management Search
Load Local Management
Soil / Climate
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Analyze Results
Planning Summary
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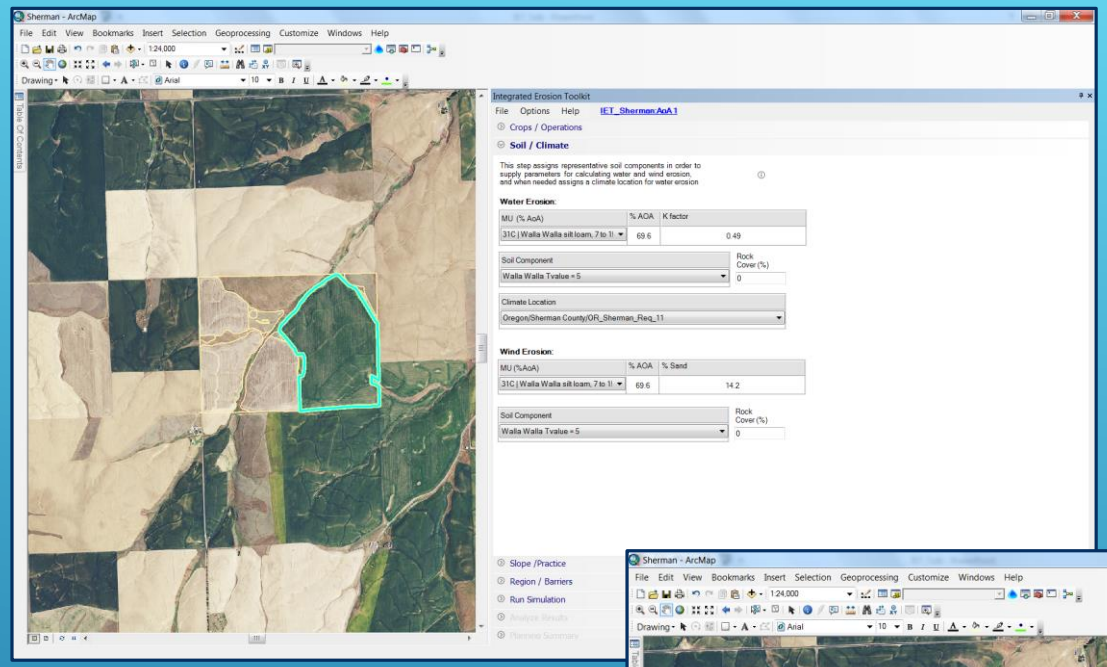
Sherman - ArcMap
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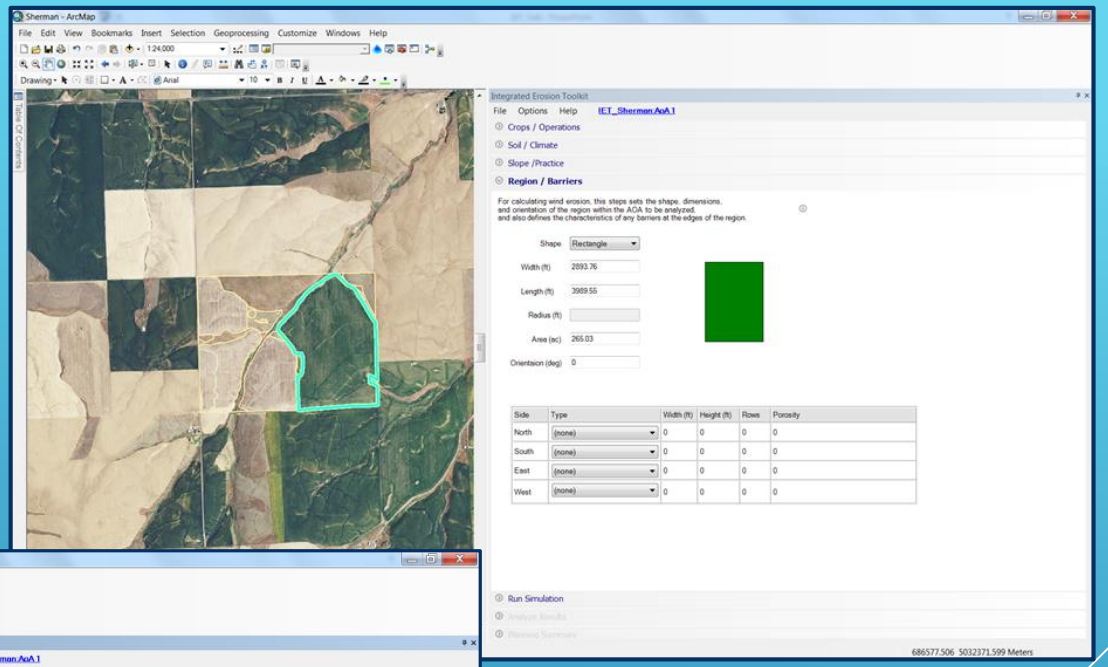
Soil / Climate
Slope /Practice
Region / Barriers
Run Simulation


Sherman - ArcMap
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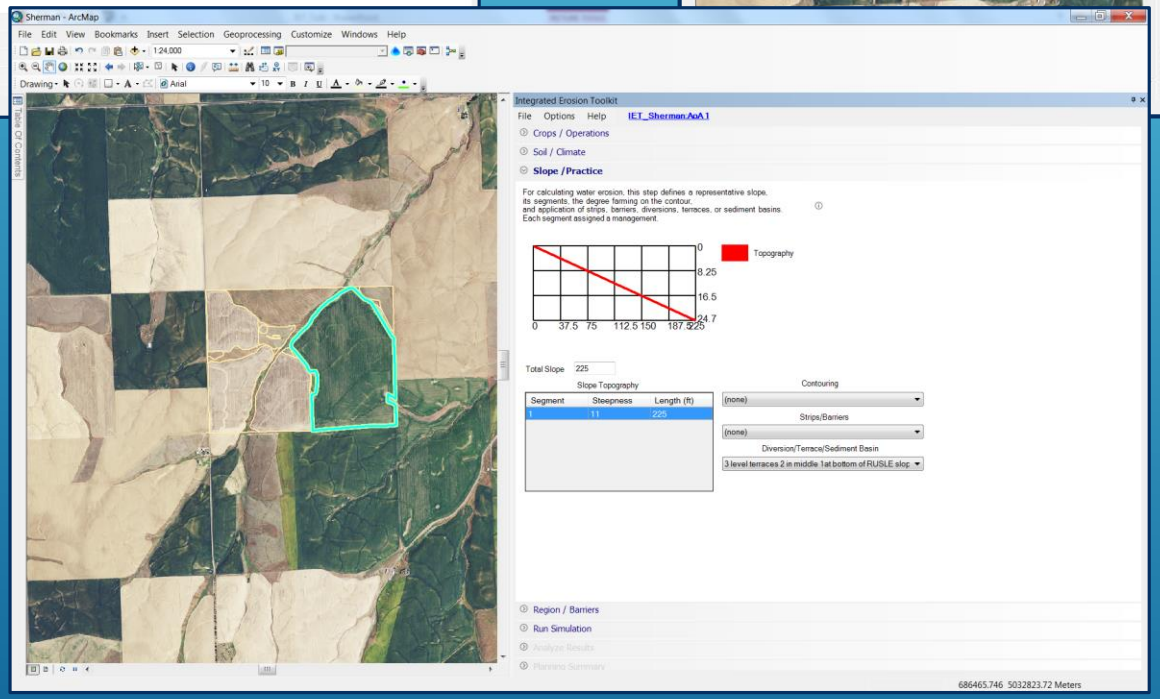
Sherman - ArcMap
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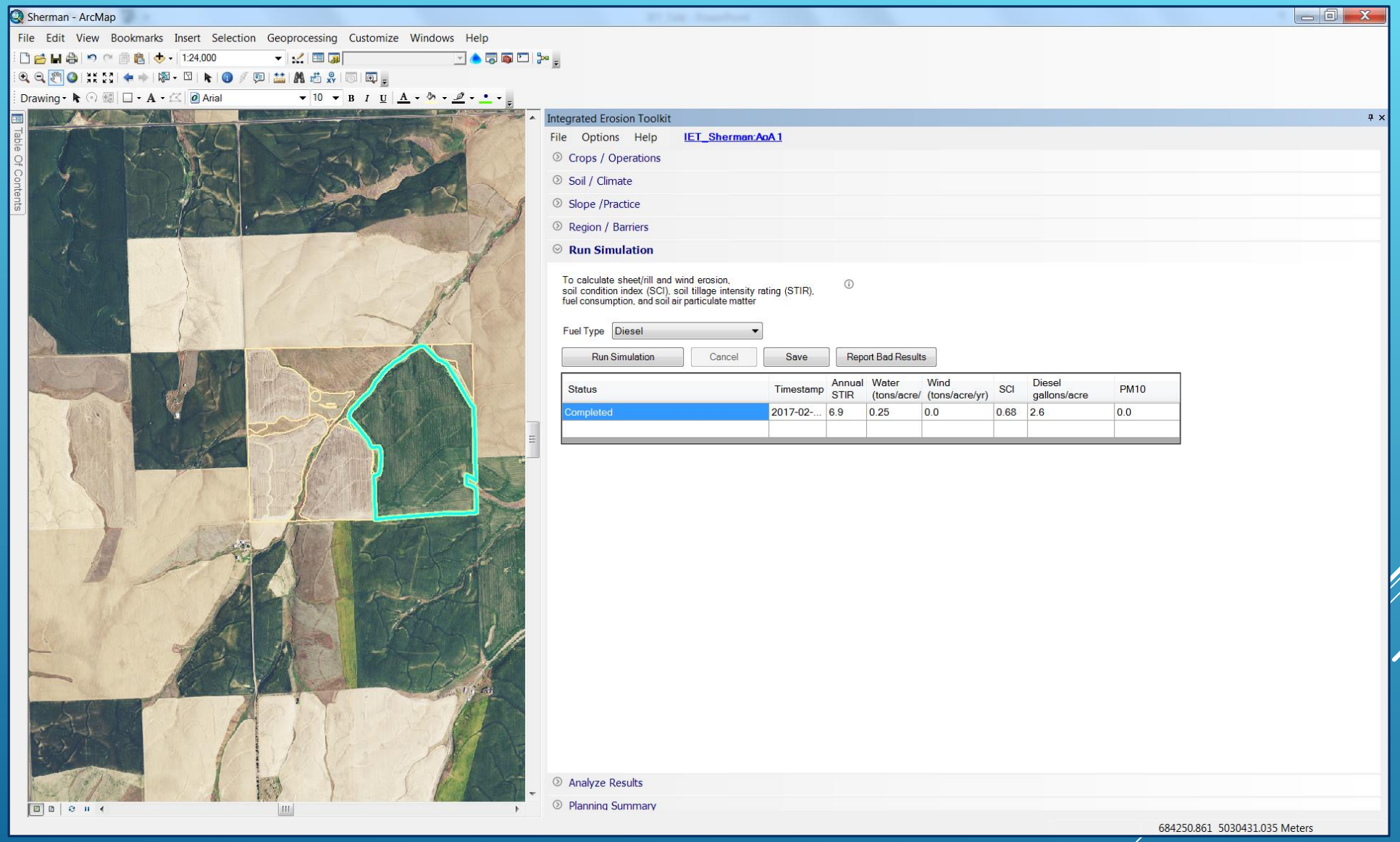
Soil / Climate
Slope /Practice
Region / Barriers
Run Simulation


Sherman - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
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Drawing
Arial
10
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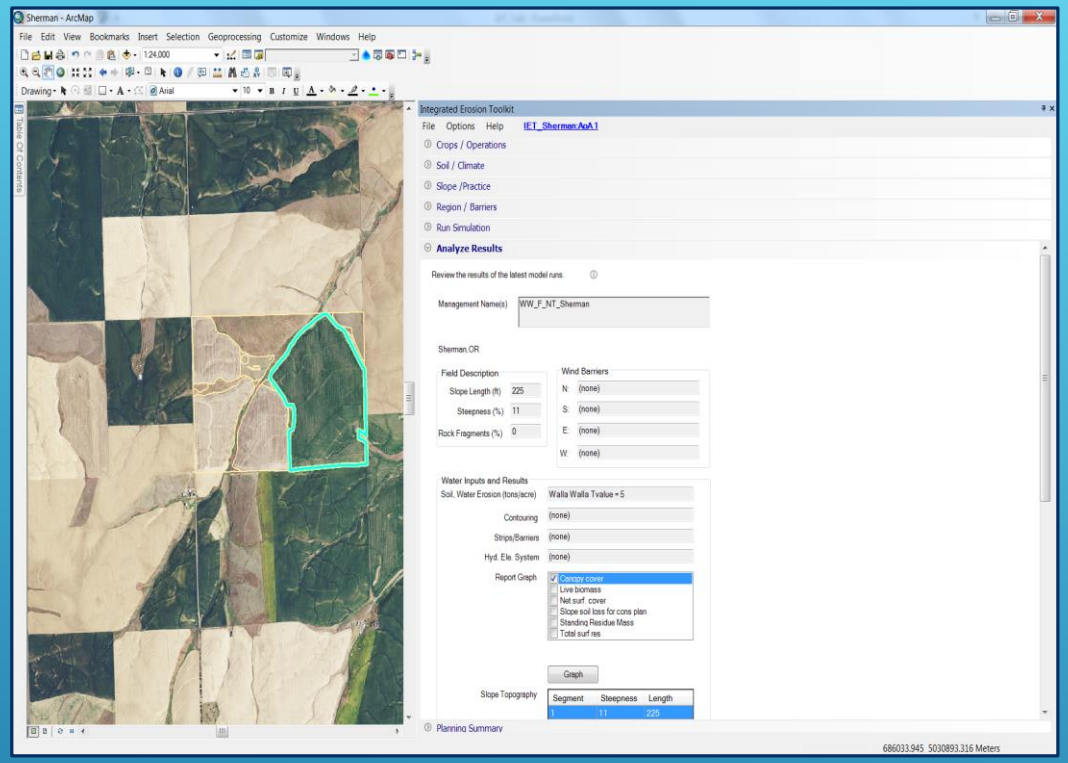
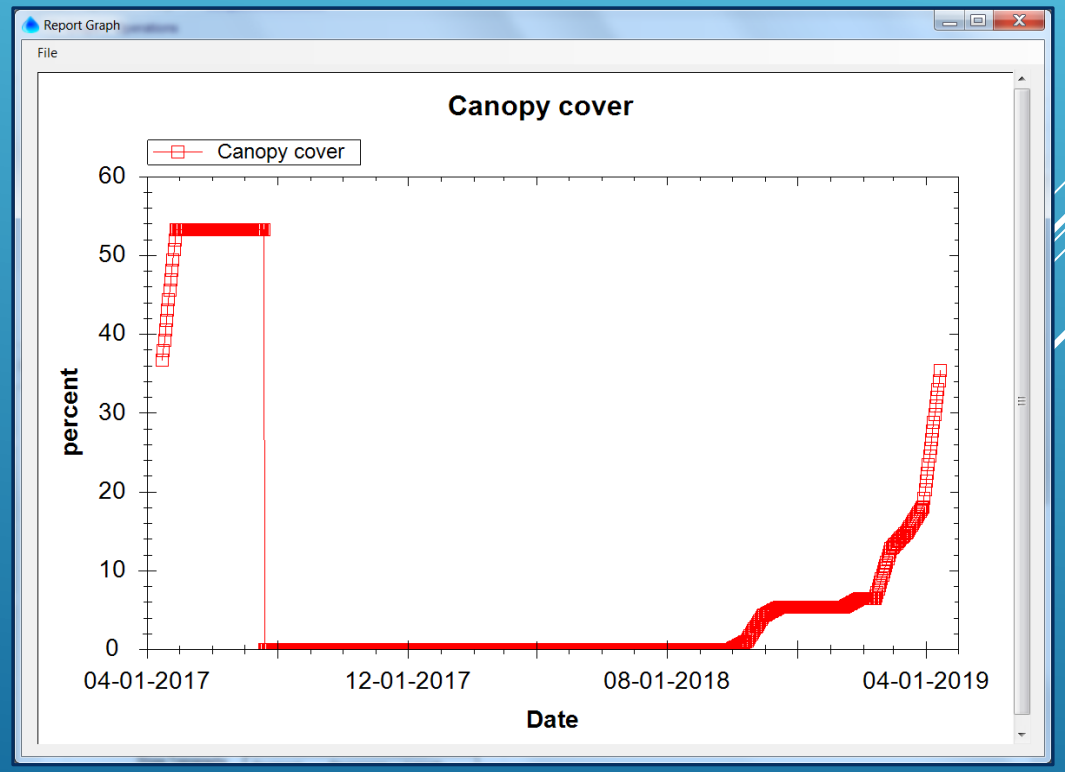
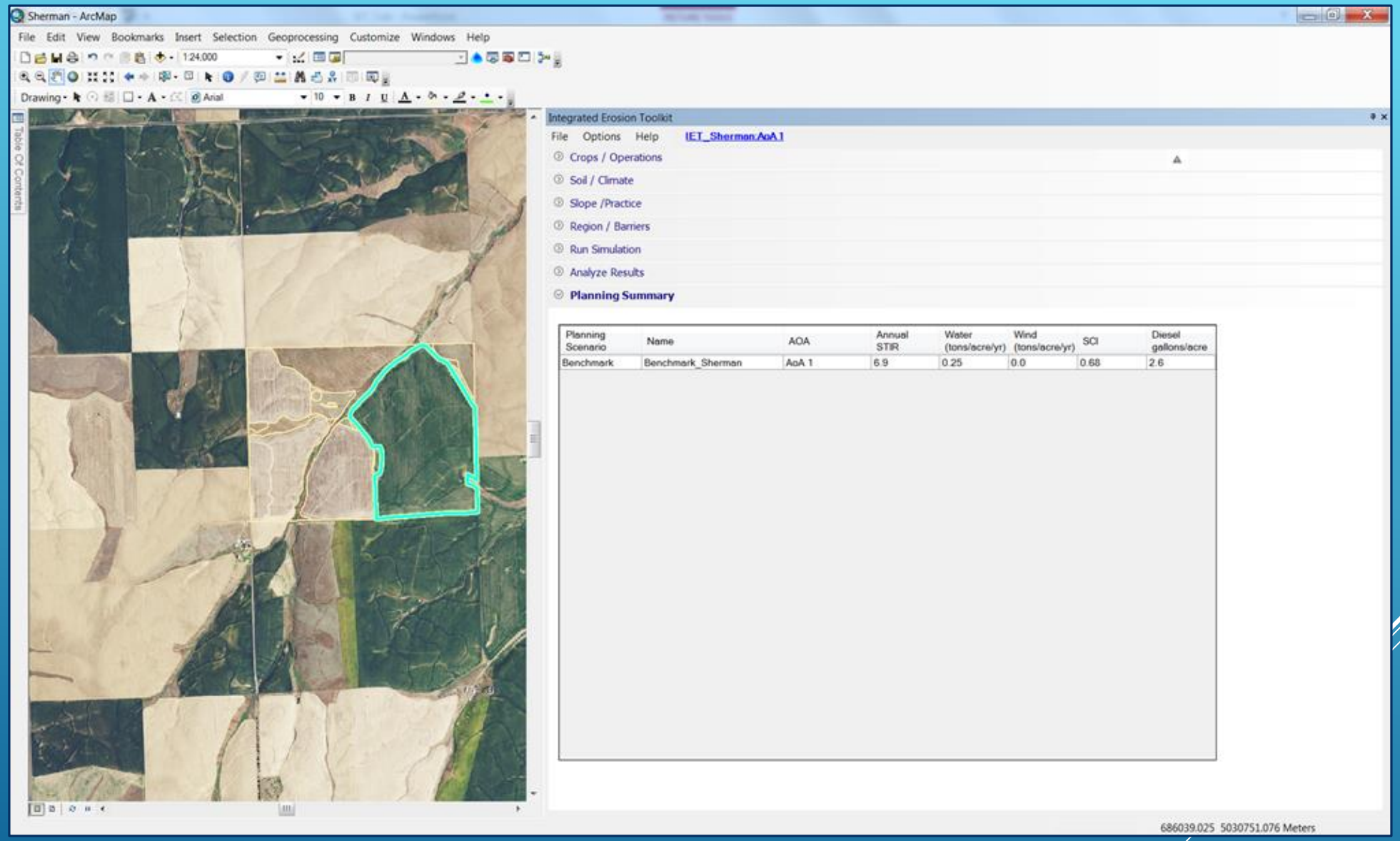
Soil / Climate
Slope /Practice
Region / Barriers
Run Simulation
To calculate sheet/rill and wind erosion, soil condition index (SCI), soil tillage intensity rating (STIR), fuel consumption, and soil air particulate matter
Fuel Type
Diesel
Run Simulation
Cancel
Save
Report Bad Results
Status
Timestamp
Annual STIR
Water (tons/acre/
Wind (tons/acre/yr)
SCI
Diesel gallons/acre
PM10
Completed
2017-02-...
6.9
0.25
0.0
0.68
2.6
0.0
Analyze Results
Planning Summary
684250.861 5030431.035 Meters


Sherman - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
Integrated Erosion Toolkit
File Options Help IET_Sherman.AoA1
Crops / Operations
Soil / Climate
Slope /Practice
Region / Barriers
Run Simulation
Analyze Results
Review the results of the latest model runs.
Management Name(s) WW_F_NT_Sherman
Sherman,OR
Field Description
Slope Length (ft) 225
Steepness (%) 11
Rock Fragments (%) 0
Wind Barriers
N (none)
S (none)
E (none)
W (none)
Water Inputs and Results
Soil, Water Erosion (tons/acre) Walla Walla Tvalue = 5
Contouring (none)
Strips/Barriers (none)
Hyd. Ele. System (none)
Report Graph
Canopy cover
Live biomass
Net surf. cover
Slope soil loss for cons plan
Standing Residue Mass
Total surf res
Graph
Slope Topography
Segment Steepness Length
1 11 225
Planning Summary
686033.945 5030893.316 Meters


Report Graph
File
Canopy cover
Canopy cover
percent
60
50
40
30
20
10
0
04-01-2017
12-01-2017
08-01-2018
04-01-2019
Date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Integrated Erosion Toolkit
File Options Help
IET_Sherman:AoA 1
Crops / Operations
Soil / Climate
Slope /Practice
Region / Barriers
Run Simulation
Analyze Results
Planning Summary
Planning Scenario | Name | AOA | Annual STIR | Water (tons/acre/yr) | Wind (tons/acre/yr) | SCI | Diesel gallons/acre
Benchmark | Benchmark_Sherman | AoA 1 | 6.9 | 0.25 | 0.0 | 0.68 | 2.6
686039.025 5030751.076 Meters

Integrated Erosion Tool

- Future webinars to Introduce the tool
- Toolkit IET Training to be provided in the coming months
- Wanted to provide broad overview today